Montana Fish, Wildlife & Parks

1400 South 19th Avenue
Bozeman, MT 59718

21 July 2015

To: Governor's Office, Tim Baker, State Capitol, Room 204, P.O. Box 200801, Helena, MT 59620-0801
Environmental Quality Council, State Capitol, Room 106, P.O. Box 201704, Helena, MT 59620-1704
Dept. of Environmental Quality, Metcalf Building, P.O. Box 200901, Helena, MT 59620-0901
Dept. of Natural Resources & Conservation, P.O. Box 201601, Helena, MT 59620-1601
Montana Fish, Wildlife & Parks:

Director's Office	Parks Division	Lands Section	FWP Commissioners
Fisheries Division	Legal Unit	Wildlife Division	Design & Construction

MT Historical Society, State Historic Preservation Office, P.O. Box 201202, Helena, MT 59620-1202
MT State Parks Association, P.O. Box 699, Billings, MT 59103
MT State Library, 1515 E. Sixth Ave., P.O. Box 201800, Helena, MT 59620
James Jensen, Montana Environmental Information Center, P.O. Box 1184, Helena, MT 59624
Janet Ellis, Montana Audubon Council, P.O. Box 595, Helena, MT 59624
George Ochenski, P.O. Box 689, Helena, MT 59624
Jerry DiMarco, P.O. Box 1571, Bozeman, MT 59771
Montana Wildlife Federation, P.O. Box 1175, Helena, MT 59624
Wayne Hurst, P.O. Box 728, Libby, MT 59923
Jack Jones, 3014 Irene St., Butte, MT 59701
Jack Atcheson, 2309 Hancock Avenue, Butte MT 59701
U.S. Army Corp of Engineers, Helena
U.S. Fish and Wildlife Service, Helena
U.S. Fish and Wildlife Service, 420 Barrett Street, Dillon, MT 59725
Big Hole Watershed Committee, P.O. Box 931, Butte, MT 59703
Montana Trout Unlimited, P.O. Box 7186, Missoula, MT 59807
Dan Vermillion, FWP Commissioner, Livingston MT
Earnest and Colleen Bacon, 2215 Fishtrap Creek Road, Wisdom, MT 59761
Dept. of Natural Resources and Conservation, 730 N. Montana Street, Dillon, MT 59725-9424
George Grant Chapter of Trout Unlimited, P.O. Box 563, Butte, MT 59703
Skyline Sportsmen, P.O. Box 173, Butte, MT 59703
Anaconda Sportsmen, 2 Cherry, Anaconda, MT 59711
E.T. Bud Moran, Chairman CSKT, PO Box 278, Pablo, MT 59855
Al Lubeck, 2710 Amherst, Ave, Butte, MT 59701
Adam Rissien, ORV Coordinator, Wildands CPR, PO Box 7516, Missoula, MT 59807
Josiah Pinkham, Tribal Arch., Nez Perce Tribe, PO Box 365, Lapwai, ID 83540

Ladies and Gentlemen:

Montana Fish, Wildlife & Parks (FWP) is proposing a multifaceted project on Van Houten Lake near Jackson, MT. The project includes building a fish migration barrier at the outlet of the lake, building spawning habitat between the lake and the barrier, removing brook trout, longnose suckers and white suckers using a fish piscicide, and reintroduce Arctic grayling and westslope cutthroat trout. Non-native brook trout are present in Van Houten Lake along with the two sucker species. The sucker species have resulted in poor fishing opportunity in Van Houten Lake, which is a popular recreational area. FWP attempted to improve the fishing by stocking burbot; however, the burbot introductions were not successful enough to have the desired effect. Multiple treatments may be necessary to eradicate existing fish in this small lake. Rotenone applied to the lake and the small inlet streams would be neutralized at the fish barrier using potassium permanganate preventing fish from being killed downstream of the proposed project areas. FWP will stock the lake in the spring of 2016 with catchable-sized sterile westslope cutthroat trout to provide for immediate fishing opportunity. Wild Arctic grayling and westslope cutthroat trout will be introduced over a three to five year period from wild sources in the Big Hole River drainage.

This EA is available for review in Helena at FWP's Headquarters, the State Library, and the Environmental Quality Council. It also may be obtained from FWP at the address provided above, or viewed on FWP's internet website: http://www.fwp.mt.gov .

Montana Fish, Wildlife & Parks invites you to comment on the attached proposal. Public comment will be accepted until August 20 at 5:00 pm. Comments should be sent to the following:

Montana Fish, Wildlife & Parks
c/o Van Houten Lake EA
1820 Meadowlark Lane
Butte, MT 59701

Or e-mailed to: jimolsen@mt.gov

Sincerely,

for Sam Sheppard

Sam B. Sheppard
Region Three Supervisor

MONTANA FISH, WILDLIFE & PARKS
FISHERIES BUREAU

Environmental Assessment for the Restoration of Native Fish in Van Houten Lake

July 2015

PART I: PROPOSED ACTION DESCRIPTION

A. Type of Proposed Action: In 2011 and 2012 burbot were introduced into Van Houten Lake in an attempt to use a native predator to control over abundant white and longnose suckers and improve the existing brook trout fishery, but the introduction has not been successful. With no reduction in suckers there has been no improvement to the limited brook trout fishery. Montana Fish, Wildlife and Parks (FWP) in cooperation with the Deerlodge National Forest are proposing to create of a fish barrier at the outlet of Van Houten Lake and use a piscicide, such as rotenone, to remove the suckers and other fish from the lake to focus the use of the location for the reintroduction and conservation of native fish species. The fish barrier would preclude upstream fish passage and prevent natural recolonization of the lake by suckers and other fish. Once the fish were removed, native westslope cutthroat trout and Arctic grayling would be introduced to the lake. In addition to a fish barrier, spawning habitat would be created in the outlet stream from the fish barrier upstream to the lake.

In 2014, FWP completed an environmental assessment (EA) to evaluate potential of the reintroduction of Arctic graying via remote site incubators into several waters of the Madison Drainage and into Wise River, Twin Lakes, Van Houten Lake and Trail Creek in the Big Hole Basin over a period of 10 years. FWP approved initiation of this effort and the decision notice for this EA was published in April 2014. An EA has already been completed for the introduction of Arctic graying to Van Houten Lake. In addition to a fish barrier, spawning habitat would be created in the outlet stream to the lake upstream of the from the fish barrier upstream to the lake.

B. Agency Authority for the Proposed Action:

- FWP is required by law (§87-1-201(9)(a) Montana Code Annotated [MCA]) to implement programs that manage sensitive fish species in a manner that assists in the maintenance or recovery of those species, and that prevents the need to list the species under § 87-5-107 MCA or the federal Endangered Species Act. Section 87-1-201(9)(a), M.C.A.

- FWP is a signatory to the Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout in Montana (FWP 1999, 2007) which states: “The management goal for WCT in Montana is to ensure the long-term, self sustaining persistence of the subspecies within each of the five major river drainages they historically inhabited in Montana, and to maintain genetic diversity and life history strategies represented by the remaining local populations."

- According to the FWP Statewide Fisheries Management Plan, the restoration goal for WCT east of the Continental Divide (Upper Missouri River Basin upstream from and including the Judith River) is to restore secure-conservation populations of WCT to 20% of the historic distribution (FWP 2012). Populations of WCT are considered secure by FWP when they are isolated from non-native fishes, typically by a physical fish passage barrier, have a population size of at least 2,500 fish, and occupy sufficient (5 to 6 miles) habitat to assure long-term persistence. Currently WCT (including slightly hybridized population > 90% WCT) occupy approximately 4% of their historic habitat. Also identified in the Fisheries Management Plan is that the primary focus for fisheries management in the upper Big Hole River drainage (from the headwaters to Dickie Bridge, which includes French Creek) will be the conservation of native Arctic grayling.

- The draft Upper Missouri River Drainage Arctic Grayling Conservation and Management Plan states that Arctic grayling restoration efforts must include:
    1. Continued efforts to maintain, and as necessary, secure and enhance remaining aboriginal Arctic grayling populations.
    2. Continued efforts to maintain, and as necessary, improve habitat conditions for extant and future Arctic grayling populations.
    3. Establishing and maintaining genetic "replicates" of existing grayling populations
    4. Seeking and implementing additional efforts to restore Arctic grayling to suitable habitats within their historic range.
    5. Continued implementation of appropriate management actions based on research and identification of essential habitats
    6. Monitoring the status of aboriginal and introduced populations
    7. Continued evaluation of the nature and any effects of competition and predation between grayling and non-native trout.

C. Estimated Commencement Date: September 2015

D. Name and Location of the Project: Environmental Assessment for the Restoration of Native Fish in Van Houten Lake**.**

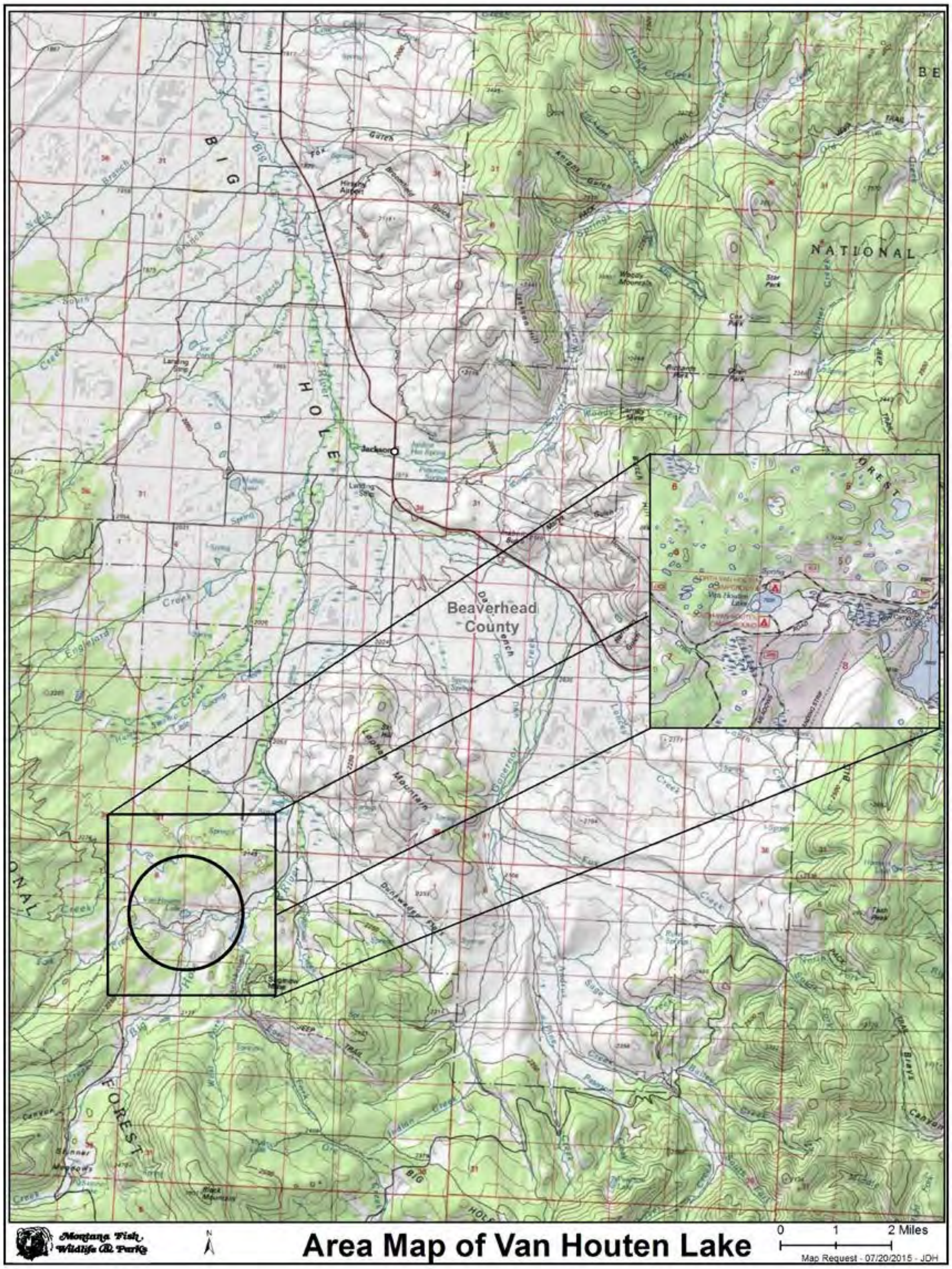
Van Houten Lake is located near the headwaters of the Big Hole River in Beaverhead County (T7S R15W Sec 7-8).

E. Project Size (acres affected)

1. Developed/residential – 0 acres
2. Industrial – 0 acres
3. Open space/Woodlands/Recreation – 0 acres
4. Wetlands/Riparian – Van Houten Lake is 11.5 acres
5. Floodplain – 0 acres
6. Irrigated Cropland – 0 acres

7. Dry Cropland – 0 acres
8. Forestry – 0 acres
9. Rangeland – 0 acres

Figure 1. Map detailing location of Van Houten Lake.



F. Narrative Summary of the Proposed Action and Purpose of the Proposed Action

Van Houten Lake is located on a small, unnamed tributary to the Big Hole River southwest of Jackson, MT. The lake and surrounding area is a popular location for recreation. There is a Forest Service designated picnic area and campground at the lake and the nearby Skinner Meadows Road provides access to the upper Big Hole and to Bloody Dick Creek. Van Houten Lake is shallow (10-ft deep) with a silt bottom and abundant lilypads located on the western end of the lake. It is unknown whether there were fish in the Van Houten Lake prior to initial stockings in 1941 of rainbow trout. From 1941 to 1963 over 90,000 rainbow trout were stocked by Montana Fish Wildlife and Parks (FWP) into the lake and no rainbow trout stocking has occurred since. In 1963 brook trout were also stocked into the lake. Rainbow trout were apparently not able to reproduce in the lake but brook trout were able to reproduce and have become self-sustaining. Longnose suckers and white suckers are also present in the lake, but it is unclear whether they were historically present in the lake or if they were introduced. Both sucker species are native fish to the Big Hole drainage.

In 2009 Van Houten Lake was sampled to determine the current status of the fishery. Two gillnets (1 floating and 1 sinking) were set in the lake overnight on June 3, 2009. Thirteen brook trout were captured in the 2 nets along with 83 white suckers and 43 longnose suckers. These data indicate that the sucker population in the lake is over abundant (outnumber brook trout 10:1). When sucker populations become over abundant, they will often compete for food with sport fish such as brook trout. This appears to be the case in Van Houten Lake where the average brook trout size is only 10.2 inches despite the apparent productivity of the lake. Several studies have documented increases in trout growth following decreases in sucker populations (Olsen and Frazer 2006). It appears that the over abundant sucker population in Van Houten Lake competes for food with the brook trout leading to slowed growth and a fishery that is below its potential. In 2011 and 2012 burbot were introduced to the lake in an attempt to use a natural predator to reduce the sucker population and indirectly improve the brook trout fishery by reducing competition for food. However, subsequent netting suggested burbot survival was limited and there was no change in the sucker population.

Because burbot introduction was not successful at reducing sucker abundance other alternatives for managing the lake are being proposed. Without a natural predator in Van Houten Lake to regulate sucker abundance, FWP in cooperation with the US Forest Service is proposing to create a fish barrier on the outlet of Van Houten Lake. FWP would remove all fish species from the lake using a piscicide such as rotenone. The barrier on the outlet of the lake would prevent any natural recolonization of the lake by suckers or other fish. The barrier would be constructed by extending the existing outlet berm of the lake downstream approximately 100 ft with fill obtained from the hill slopes adjacent to the existing outlet of the lake (Figure 2). The existing berm which regulates the lake elevation would not be changed. Extending the fill of the outlet downstream will result in gaining the necessary elevation to create a 5-ft high waterfall that will preclude upstream fish passage. The waterfall will be constructed of stacked boulders (Figure 3) with a splash pad at the base that will prevent pool formation.

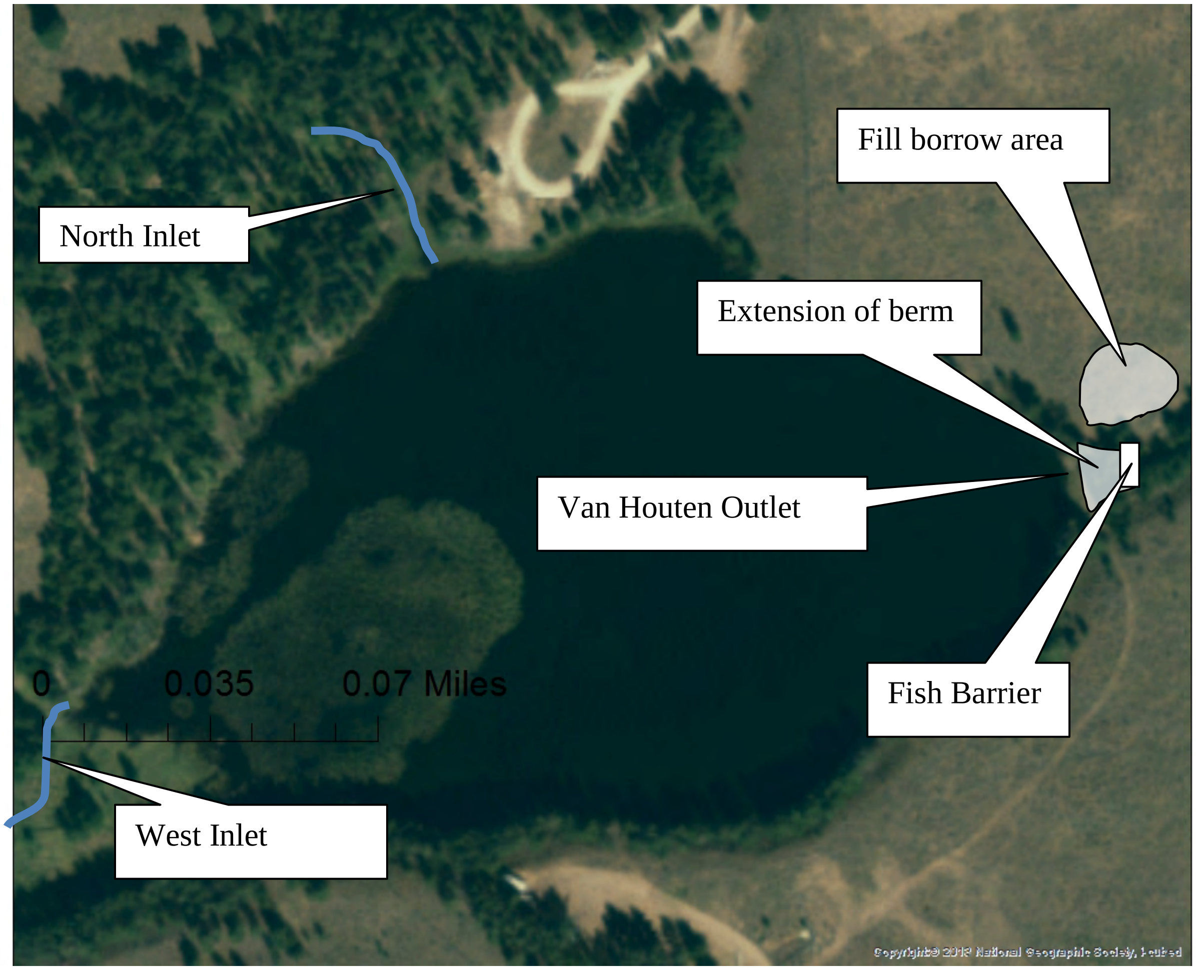


Figure 2. Aerial view of Van Houten Lake showing location of inlets and barrier structure.

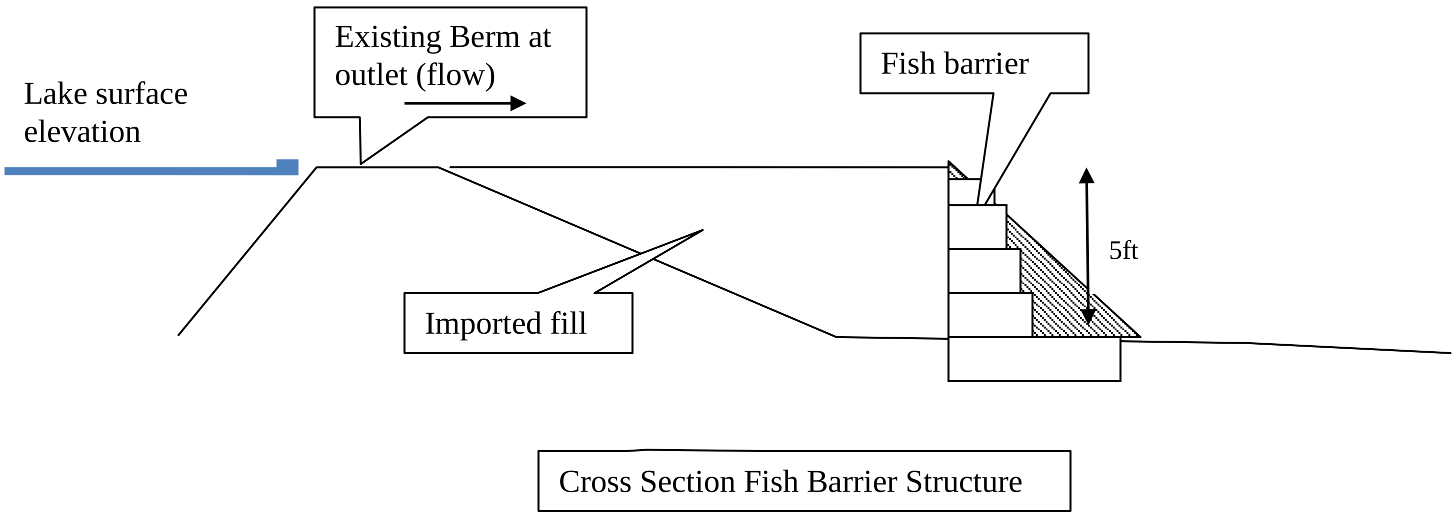


Figure 3. Cross section of the proposed fish barrier at the outlet of Van Houten Lake.

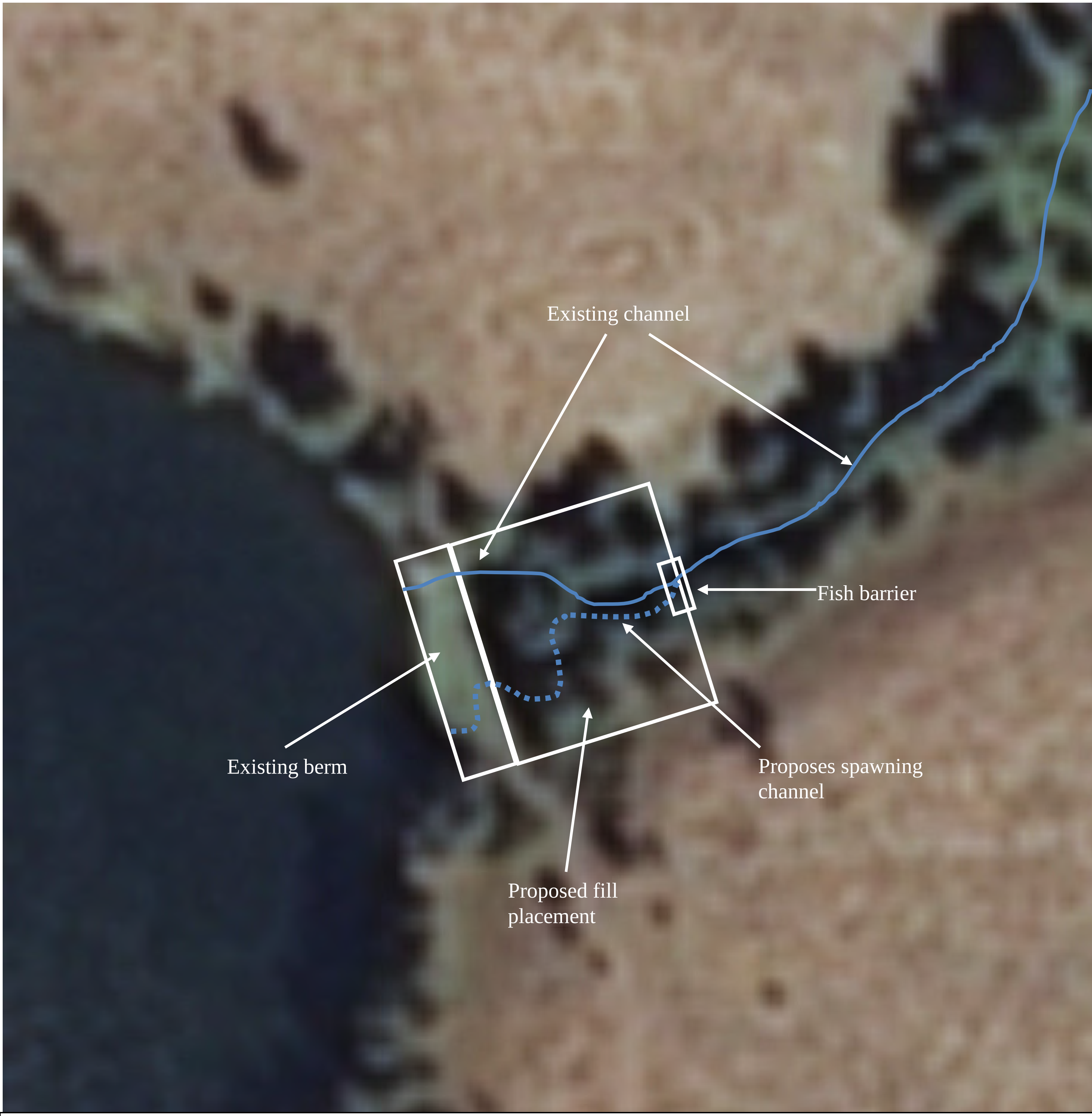


Figure 4. Aerial view of proposed fish barrier and spawning channel at the outlet of Van Houten Lake.

The creation of an outlet spawning channel is being proposed for the area upstream of the barrier waterfall (Figure 4 and 5). The two inlet streams provide some spawning habitat for salmonids in Van Houten Lake but the habitat is limited due to the small size of the streams. However, at the outlet where the flow of the 2 streams is combined there is approximately 1.3 cfs which is adequate to support a spawning channel. Lake outlets are often ideal areas for spawning habitat because the water exiting the lake is warmer leading to faster egg development and fry emergence. The spawning channel would be constructed within an inset floodplain whose dimensions would be 4 ft wide by 2 ft deep (Figure 5). The channel would be roughly 24-30 inches wide with water depths between 12 and 18 inches deep (bankfull channel width downstream of the barrier structure is 36 inches, but water depths are less than 1 ft deep). There would be approximately 0.8 ft of fall through the 125 ft of spawning channel. The channel banks would be formed by importing sods from areas adjacent to the project site. Spawning gravel would be imported to provide adequately sized material for Arctic grayling and westslope cutthroat trout spawning.

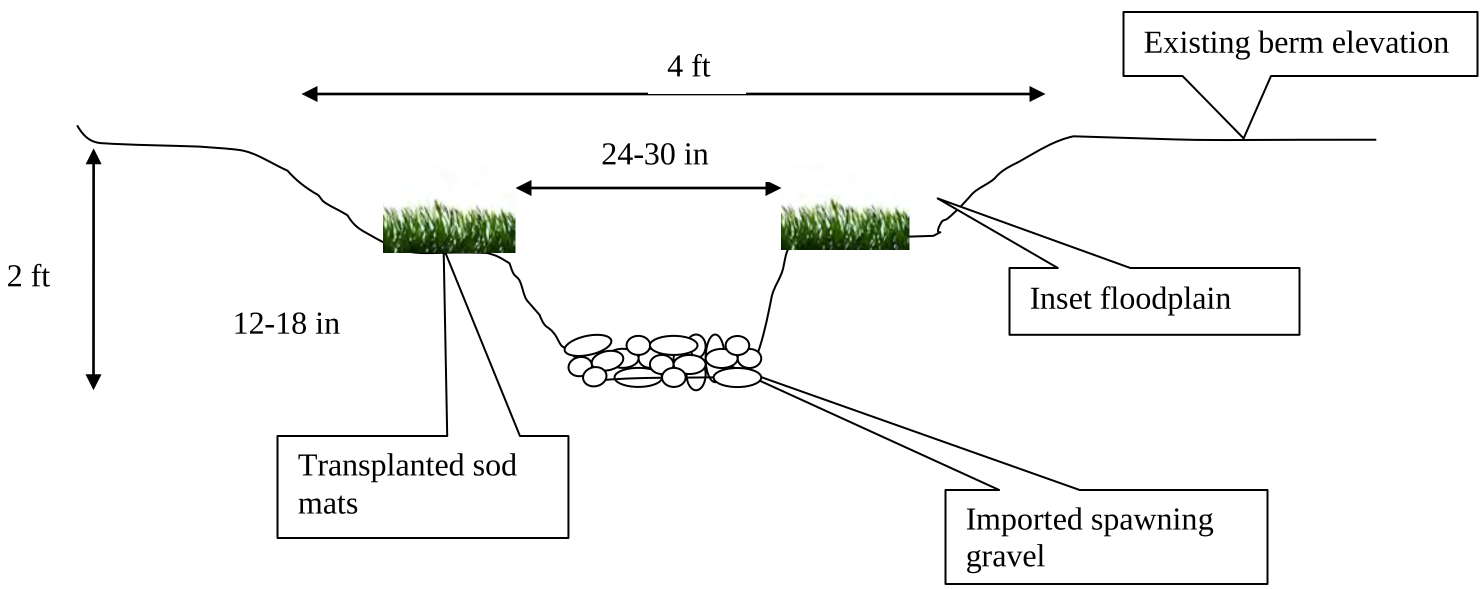


Figure 5. Cross section of the proposed spawning channel.

Once a fish barrier is in place the lake would be proposed for treatment with rotenone to remove the over-abundant sucker population and non-native brook trout. This treatment would occur in the fall after irrigation season, the heavy recreation season, and the fish barrier is in place. Any treated water exiting the lake would be neutralized using potassium permanganate to prevent killing fish downstream of the lake. Potassium permanganate quickly neutralizes any remaining rotenone in the water such that fish downstream of the fish barrier are not affected. Neutralization of the water leaving the lake would continue until fish held in a cage can survive for 4 hours in the lake. This will likely take between 4 days and 2 weeks in Van Houten Lake. The breakdown time of rotenone depends on several factors including dilution with fresh water, sun light exposure and water chemistry.

After removal of the fish from the lake and once the lake is free of ice in the spring, eggs and/or fry from wild grayling and westslope cutthroat would be stocked into the lake. The stocking of wild grayling and cutthroat would continue for up to 3 years to ensure that multiple age classes of fish are present in the lake. Catchable size sterile westslope cutthroat trout from the Anaconda Hatchery may also be stocked the first year after treatment to provide a recreational fishery as soon as possible following fish removal. Fertile westslope cutthroat stocked into Van Houten Lake will come from wild sources within the Big Hole drainage. An EA has already been completed for the introduction of Arctic grayling into Van Houten Lake. Arctic grayling would potentially come from 2 native populations in the Big Hole in Mussigbrod Lake and Miner Lake. Fish harvest would be allowed at the lake but special regulation may be put in place limiting the number of fish that can be kept to protect the native fish if harvest appears to be impacting the fishery. The removal of the sucker population will likely result in the creation of a much improved fishery. Growth rates of introduced trout and grayling will likely be greater following sucker removal resulting in higher quality fish being available for anglers to catch. The lake would also become a brood source for being able to collect eggs from wild fish in the future to aid in further restoration efforts.

PART II. ALTERNATIVES

Alternative 1 – No action

This alternative would include status quo management of Van Houten Lake. The sport fishery in the lake would not reach its potential because of the overpopulated sucker population and the resulting competition with brook trout. Because Van Houten Lake is a popular recreational area with a campground and picnic area nearby, it is important to manage the fishery so that opportunities are available to anglers to catch and potentially harvest sport fish. While brook trout are currently available to anglers, it is likely that the fishery would greatly improve if the suckers in the lake were eliminated and westslope cutthroat trout and Arctic grayling were introduced. The No Action alternative would not result in the expansion of westslope cutthroat trout within Southwestern, Montana; thus, not helping to satisfy the goals of the WCT MOU or the Statewide fish management plan. Grayling could still be stocked into Van Houten Lake, but westslope cutthroat trout could not, and grayling success may be lower due to the presence of both brook trout and sucker species. No impacts would be anticipated to the existing soils, vegetation or resident wildlife or amphibian species. The benefits to the No Action alternative versus the other alternatives considered is that there would be no temporary decline in the fishery of the lake related to fish removal.

Alternative 2 – Proposed Action: Establish a fish barrier at the outlet of the lake and remove the suckers and existing brook trout

This alternative, as described above, would involve the creation of a fish barrier at the outlet of the lake and removal of the suckers and non-native brook trout using a piscicide such as rotenone. Spawning habitat would be created in the outlet of the lake and native westslope cutthroat trout and Arctic grayling would be introduced to the lake. The benefits of the project would be an improved recreational fishery for trout and grayling in the lake that would be very accessible to the public. Additionally the lake would aid in conserving native fish species by replicating 2 of the native, lake-dwelling Arctic grayling populations and serving as a potential brood source for westslope cutthroat trout in the Big Hole. The success of the reintroductions of westslope cutthroat trout and Arctic grayling would be evaluated by FWP periodically after the project was completed.

Alternative 3 –Mechanically (netting and/or electrofishing) suppression of suckers from Van Houten Lake to improve the brook trout fishery and potentially introducing native Arctic grayling and westslope cutthroat trout.

Mechanical suppression of suckers would consist of trap netting and potentially electrofishing Van Houten Lake. Both methods are non-lethal and therefore, sport fish species such as brook trout in this case, could be returned to the lake while the suckers could be killed and removed. Trap netting can be particularly effective at capturing suckers when done in the spring when the adult suckers are spawning in tributary streams and along the lake shoreline. If brook trout are not removed from Van Houten Lake it still may be possible to introduce native Arctic grayling and westslope cutthroat trout to the lake. Adfluvial Arctic grayling coexist with introduced brook trout populations in both Miner Lakes and Mussigbrod Lake. It is likely that they would coexist with brook trout in Van Houten Lake as well. Unlike Arctic grayling, there are few examples where native westslope cutthroat trout successfully coexist with brook trout. While brook trout cannot cross breed with westslope cutthroat trout, competition between the two species in stream environments has been well documented with detrimental impacts to native cutthroat. Brook trout, westslope cutthroat and Arctic grayling occupy similar niches and brook trout are known to be highly fecund so it is possible brook trout in Van Houten Lake could negatively impact native salmonids.

One of the drawbacks of mechanical suppression is cost and effort associated with initial sucker removals and the long-term maintenance that would be required to manage the fishery. To have a major effect on the sucker population in Van Houten Lake using mechanical means, it is likely that a crew of 3 people for 5 days per year for a period of approximately 3 years would be necessary to reduce the sucker abundance in the lake. To maintain the suckers at low abundance it would be necessary to repeat removal efforts every 2-4 years thereafter in perpetuity. Alternatively, the proposed action would require no long-term, repeated actions to maintain the fishery. To completely remove suckers and brook trout with rotenone will require a 3 person crew for 1 day and an additional person to perform neutralization for 4-7 days. Using mechanical means, it would likely be impossible to completely remove suckers from Van Houten Lake. Further, without a fish barrier at the outlet of the lake, suckers could potentially recolonize the lake from the Big Hole River located less than a mile downstream from the lake. Mechanical suppression of suckers in Van Houten Lake was eliminated from further analyses given the anticipated costs and inability to satisfy the project objectives.

PART III. ENVIRONMENTAL REVIEW

A. PHYSICAL ENVIRONMENT

1. LAND RESOURCES **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Soil instability or changes in geologic substructure?		X				
b. Disruption, displacement, erosion, compaction, moisture loss, or over-covering of soil which would reduce productivity or fertility?			X		Yes	1b
c. Destruction, covering or modification of any unique geologic or physical features?		X				
d. Changes in siltation, deposition or erosion patterns that may modify the channel of a river or stream or the bed or shore of a lake?			X			1d.
e. Exposure of people or property to earthquakes, landslides, ground failure, or other natural hazard?		X				

Comment 1b. The construction of the fish migration barrier will lead to the displacement of native fill material and the temporary loss of ground productivity. The borrow area for fill for the fish barrier is adjacent to the barrier site. This area is primarily colonized by native sage brush and grasses. Topsoil and existing vegetation will be salvaged and replaced to the disturbed area once fill is removed.

Comment 1d. The modification of the Van Houten Lake outlet will cause a change in the location of the stream bed exiting the lake. The outlet stream of the lake will be raised in elevation and relocated to accommodate a spawning channel. This channel will be low gradient and have the dimensions shown in Figure 5 above. The new channel will come to equilibrium with the new elevation and sediment dynamics, therefore no mitigation is required. The channel downstream of the fish barrier will be unaffected. There may be some minor amounts of turbidity generated during the construction of the fish barrier. However, these are anticipated to be minimal because the elevation of the lake would be lowered prior to channel construction so much of the work would be done in the dry.

2. WATER **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Discharge into surface water or any alteration of surface water quality including but not limited to temperature, dissolved oxygen or turbidity?			X		Yes	2a

b. Changes in drainage patterns or the rate and amount of surface runoff?		X				
c. Alteration of the course or magnitude of flood water or other flows?			X		No	2c
d. Changes in the amount of surface water in any water body or creation of a new water body?		X				
e. Exposure of people or property to water related hazards such as flooding?		X				
f. Changes in the quality of groundwater?		X				2f
g. Changes in the quantity of groundwater?		X				
h. Increase in risk of contamination of surface or groundwater?			X		Yes	see 2a,f
i. Effects on any existing water right or reservation?		X				
j. Effects on other water users as a result of any alteration in surface or groundwater quality?			X		Yes	See 2j
k. Effects on other users as a result of any alteration in surface or groundwater quantity?		X				
l. Will the project affect a designated floodplain?		X				
m. Will the project result in any discharge that will affect federal or state water quality regulations? (Also see 2a)			X		Yes	2m

Comment 2a: The proposed project is designed to intentionally introduce a piscicide to surface water to remove unwanted fish. The impacts would be short term and minor. Rotenone in the formulation (5% active ingredient) is an EPA registered piscicide and is safe to use for removal of unwanted fish, when handled and applied according to the product label. The concentration of rotenone to be used is 1 part formulation to one million parts of water (ppm).

There are three ways in which rotenone can be detoxified once applied. The most common method is to allow natural breakdown to occur. Rotenone is a compound that is susceptible to natural breakdown (detoxification) through a variety of mechanisms such as water chemistry, water temperature, exposure to organic substances, exposure to air, and sunlight intensity (Ware 2002; ODFW 2002; Loeb and Engsrtom-Heg 1970; Engstrom-Heg 1972; Gilderhus et al. 1986). Rotenone persistence studies by Gilderhus et al. (1986) and Dawson et al. (1991) found that in cool water temperatures of 32 to 46^{o}F the half-life ranged from 3.5 to 5.2 days. Gilderhus et al. (1986) reported that 30% mortality was experienced in rainbow trout exposed to degrading concentrations of actual rotenone (0.004 ppm) in 46^{o}F pond water 14 days after a treatment. By day 18 the concentrations were sub lethal to trout.

The second method for detoxification involves basic dilution by fresh water. This may be accomplished by fresh ground water or surface water flowing into a lake or stream. The final method of detoxification involves the application of an oxidizing agent like potassium permanganate. This dry crystalline substance is mixed with stream or lake water to produce a concentration of liquid sufficient to detoxify the rotenone. Detoxification is accomplished after about 15-30 minutes of exposure time between the two compounds (Prentiss Inc. 1998, 2007). Because the lake elevation will be lowered prior to the application of rotenone, we expect the lake to naturally detoxify within 4-8 days after application. At the fish barrier, potassium permanganate will be used to detoxify any rotenone treated waters exiting the lake to prevent fish rotenone from traveling downstream.

Dead fish would result from this project. Bradbury (1986) reported that 9 of 11 water bodies in Washington treated with rotenone experienced an algae bloom shortly after treatment. This is attributed to the input of phosphorus to the water as a result of decaying fish. Bradbury further notes that approximately 70% of the phosphorus content of the fish stock would be released into the water through bacterial decay. This action may be beneficial because it would stimulate algae production and would start the stream toward production of food for fish. Any changes or impacts to water quality resulting from decaying fish would be short term and minor.

During barrier construction it is likely that minimal amounts of turbidity would be generated. Barrier installation would require adding fill material at the existing outlet. The amount of turbidity generated should be minimal because work would be done in low water conditions in the fall and the lake would be lowered in elevation prior to construction. A 318 permit from the Montana Department of Environmental Quality (DEQ) would be obtained prior to construction activities that may cause an increase in turbidity.

Comment 2c. The opening at the crest of the barrier structure would be 4 ft wide. Van Houten Lake has a very small drainage area (0.18 sq miles) and therefore the predicted discharge at the 5, 50 and 100 year intervals are minimal (2.9, 11.6, 14.9 cfs). At the 100-year flood elevation, water surface elevation at the barrier (assuming weir flows and a 4-ft wide opening) would be 1.6 ft. The constructed banks of the outlet stream would be 2 ft above the elevation of the barrier structure so the constructed outlet channel should have adequate freeboard to pass flows exceeding the 100 year event. Further, since there would be no change in the lake elevation or the configuration of the existing berm that forms the outlet of the lake there should be no additional risk of flooding by establishing the fish barrier structure.

Comment 2f: No contamination of groundwater is anticipated to result from this project. Rotenone binds readily to sediments, and is broken down by soil and in water (Skaar 2001; Engstrom-Heg 1971, 1976; Ware 2002). Rotenone moves only one inch in most soil types; the only exception would be sandy soils where movement is about three inches (Hisata 2002). In California, studies where wells were placed in aquifers adjacent to and downstream of rotenone applications have never detected rotenone, rotenolone, or any of the other organic compounds in the formulated products (CDFG 1994).

Case studies in Montana have concluded that rotenone movement through groundwater does not occur. For example, at Tetrault Lake, Montana, neither rotenone nor inert ingredients were detected in a nearby domestic well, which was sampled two and four weeks after applying 90 parts per billion (ppb) rotenone to the lake. This well was chosen because it was down gradient from the lake and also drew water from the same aquifer that fed and drained the lake. In 1998, a Kalispell-area pond was treated with Prenfish 5% rotenone. Water from a well, located 65 feet from the pond, was analyzed and no evidence of rotenone was detected. In 2001, another Kalispell-area pond was treated with Prenfish 5% rotenone. Water from a well located 200 feet from that pond was tested four times over a 21 day period and showed no sign of contamination. In 2005, FWP treated a small pond near Thompson Falls with Prenfish to remove pumpkinseeds and bass. A well located 30 yards from the pond was tested and neither Prenfish nor inert ingredients were found in the well. In Soda Butte Creek near Cooke City, Montana, a well at a Forest Service campground located 50 feet from a treated stream was tested immediately following treatment with Prenfish. After 10 months, no traces of rotenone were found (Olsen 2006). Because rotenone is known to bind readily with stream and lake substrates, we do not anticipate any contamination of ground water as a result of this project.

Comment 2j: The Legumine (rotenone formulation) label states "….Do not use water treated with rotenone to irrigate crops or release within 1/2 mile upstream of a potable water or irrigation water intake in a standing body of water such as a lake, pond or reservoir…" There are no irrigation diversions from the unnamed outlet of Van Houten Lake to the confluence of the Big Hole River. At the Big Hole River, the flows are diluted by at least an order of magnitude so if treated water were to reach the Big Hole River it would be diluted to a point that it would no longer be lethal to fish or other aquatic or terrestrial life.

Comment 2m: Construction of the fish barrier would result in the generation of minor amounts of turbidity. This would require obtaining permits from the Montana DEQ who regulates and enforces laws regarding water quality. FWP would submit a Notice of Intent for the purpose of applying a piscicide to a stream from Montana DEQ under the Pesticide General Permit.

3. AIR **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Emission of air pollutants or deterioration of ambient air quality? (also see 13 (c))			X		Yes	3a
b. Creation of objectionable odors?		X				
c. Alteration of air movement, moisture, or temperature patterns or any change in climate, either locally or regionally?		X				
d. Adverse effects on vegetation, including crops, due to increased emissions of pollutants?		X				
e. Will the project result in any discharge which will conflict with federal or state air quality regs?		X				

Comment 3a: Emissions would be generated as a result of operating vehicles and equipment during barrier construction and fish removal. These impacts should be minor and temporary as barrier construction is anticipated to last only 1-2 days and fish removal is anticipated to last only 1-2 days. The project would be completed in the fall after the busy recreation season so there would likely be few people in the area.

4. <u>VEGETATION</u> **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Changes in the diversity, productivity or abundance of plant species (including trees, shrubs, grass, crops, and aquatic plants)?			X		Yes	4a
b. Alteration of a plant community?		X				
c. Adverse effects on any unique, rare, threatened, or endangered species?		X				
d. Reduction in acreage or productivity of any agricultural land?		X				
e. Establishment or spread of noxious weeds?		X				
f. Will the project affect wetlands, or prime and unique farmland?		X				

Comment 4a: There would be some disturbance of vegetation along the outlet of the lake during the construction of the fish barrier. These impacts should be short term and minor as topsoil would be replaced and seeded. Sod mats would be salvaged and used to construct the streambanks of the outlet channel. The topsoil and existing vegetation from the fill borrow area would be salvaged and used to reclaim the surface of the borrow area when construction is complete. These impacts should be minor because the size of the footprint of both structures. Impacts would be mitigated by reseeding disturbed areas with native grass seed mix.

Rotenone does not have an effect on plants at concentrations used to kill fish. Vegetation disturbances are expected to be short term and minor.

5. <u>FISH/WILDLIFE</u> **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Deterioration of critical fish or wildlife habitat?		X				
b. Changes in the diversity or abundance of game animals or bird species?			X		Yes	5b
c. Changes in the diversity or abundance of nongame species?			X		Yes	5c
d. Introduction of new species into an area?			X			5d
e. Creation of a barrier to the migration or			X		No	5e

movement of animals?						
f. Adverse effects on any unique, rare, threatened, or endangered species?			X		Yes	5f
g. Increase in conditions that stress wildlife populations or limit abundance (including harassment, legal or illegal harvest or other human activity)?			X		Yes	5g
h. Will the project be performed in any area in which T&E species are present, and will the project affect any T&E species or their habitat? (Also see 5f)			X		Yes	See 5f
i. Will the project introduce or export any species not presently or historically occurring in the receiving location?			X		Yes	5d

Comment 5b: This project is designed to eradicate native sucker species in Van Houten Lake to improve the trout fishery. Brook trout are also present in the lake and would be removed. These impacts are minor and temporary because the WCT and Arctic grayling would be restocked into the lake and replace the existing fishery. Further, the quality of the fishery will likely improve with the lack of suckers. Rotenone when applied at fish killing concentration has no impact on terrestrial wildlife including birds and mammals that consume dead fish or treated waters.

Comment 5c: Non-game, non-target species that would be impacted include some aquatic invertebrates. Columbia spotted frogs have been documented in Van Houten Lake and western toads may also be present. Adult frogs are not impacted by rotenone at fish killing concentrations; however, non metamorphosed tadpoles that respire through their skin and/or gills are affected. The timing of this project (early fall rotenone application) should mitigate any impacts to spotted frogs and western toads because most will have metamorphosed when the rotenone treatment phase of this project is being proposed.

Comment 5d. Arctic grayling would be introduced as a result of this project. Arctic grayling currently do not exist in Van Houten Lake. It is unknown whether or not Arctic grayling were historically present in Van Houten Lake or not. Introducing Arctic grayling as a result of the EA would be a positive outcome as achieving conservation actions benefit Arctic grayling is a conservation priority of FWP.

<u>Aquatic Invertebrates</u>:

Numerous studies indicate that rotenone has temporary or minimal effects on aquatic invertebrates. The most noted impacts are temporary and often substantial reduction in invertebrate abundance and diversity. In a study of the impacts of a rotenone treatment in Soda Butte Creek in south-central Montana, aquatic invertebrates of nearly all taxa declined dramatically immediately post rotenone treatment; however, only one year later nearly all taxa were fully recovered and at greater abundance than pre treatment (Olsen and Frazer 2006). One study reported that no long-term significant reduction in aquatic invertebrates was observed due to the effects of rotenone, which was applied at levels twice as high as the levels proposed for this project (Houf and Campbell 1977). Chandler and Marking (1982) found that clams and snails were between 50 and 150 times more tolerant than fish to Noxfish (5% rotenone formulation). In all cases, the reduction of aquatic invertebrates was temporary, and most treatments used a higher concentration of rotenone than proposed for this project (Schnick 1974). In a study on the relative tolerance of different aquatic invertebrates to rotenone, Engstrom-Heg et al. (1978) reported that the long-term impacts of rotenone are mitigated because those insects that were most sensitive to rotenone also tended to have the highest rate of recolonization. Temporary changes in aquatic invertebrate community structure due to a rotenone treatment could be similar to what is observed after natural (e.g. fire) and anthropogenic (livestock grazing) disturbances (Wohl and Carline 1996; Mihuc and Minshall. 2005; Minshall 2003), though the physical impacts and resulting modifications of invertebrate assemblages after these types disturbances can last for a much longer period than a piscicide treatment.

Because of their short life cycles (Anderson and Wallace 1984), good dispersal ability (Pennack 1989), and generally high reproductive potential (Anderson and Wallace 1984), aquatic invertebrates are capable of rapid recovery from disturbance (Boulton et al. 1992; Matthaei et al. 1996). Recolonization would include aerially dispersing invertebrates from downstream areas (e.g. mayflies, caddisflies, dipterans, stoneflies).

The possibility of eliminating a rare or endangered species of aquatic invertebrate in Van Houten Lake by treating with rotenone is very unlikely. In SW Montana, FWP’s piscicide detoxification policy, aquatic invertebrates are routinely collected prior to WCT restoration projects in mountain streams (e.g., Eureka, Little Tepee, Little Tizer, Elkhorn, Crazy, Whitehorse, Soda Butte creeks). In all cases, these collections have shown aquatic invertebrate assemblages typical of headwater streams in southwestern Montana, and in no cases have threatened or endangered species been discovered. There are no known threatened or endangered invertebrates in areas surrounding Van Houten Lake. FWP expects that Van Houten Lake contains the same type of aquatic invertebrate assemblage as found in other nearby waters and the possibility of eliminating a rare or endangered species is minimal.

Based on these studies, FWP would expect the aquatic invertebrate species composition and abundance in Van Houten Lake to return to pre-treatment diversity and abundance within one to two years after treatment and therefore the impacts to aquatic invertebrate communities should be short-term and minor.

Birds and Mammals:

Mammals are generally not affected by rotenone at fish killing concentrations because they neutralize rotenone by enzymatic action in their stomach and intestines (AFS 2002). Studies of risk for terrestrial animals found that a 22 pound dog would have to drink 7,915 gallons of treated lake water within 24 hours, or eat 660,000 pounds of rotenone-killed fish, to receive a lethal dose (CDFG 1994). The State of Washington reported that a half pound mammal would need to consume 12.5 mg of pure rotenone to receive a lethal dose (Bradbury 1986). Considering the only conceivable way an animal can consume rotenone under field conditions is by drinking lake or stream water or consuming dead fish, a half pound animal would need to drink 33 gallons of water treated at 2 ppm.

The EPA (2007) made the following conclusion for small mammals and large mammals;

> *When estimating daily food intake, an intermediate-sized 350 g mammal will consume about 18.8 g of food. Using data previously cited from the common carp with a body weight of 88 grams, a small mammal would only consume 21% (18.8/88) of the total carp body mass. According to the data for common carp, total body residues of rotenone in carp amounted to 1.08 µg/g. A 350-g mammal consuming 18.8 grams represents an equivalent dose of 20.3 µg of rotenone; this value is well below the median lethal dose of rotenone (13,800 µg) for similarly sized mammals. When assessing a large mammal, 1000 g is considered to be a default body weight. A 1,000 g mammal will consume about 34 g of food. If the animal fed exclusively on carp killed by rotenone, the equivalent dose would be 34 g *1.08 µg/g or 37 µg of rotenone. This value is below the estimated median lethal equivalent concentration adjusted for body weight (30,400 µg). Although fish are often collected and buried to the extent possible following a rotenone treatment, even if fish were available for consumption by mammals scavenging along the shoreline for dead or dying fish, it is unlikely that piscivorous mammals will consume enough fish to result in observable acute toxicity.*

One study, in which rats were injected with rotenone for a period of weeks, reported finding lesions characteristic of Parkinson's disease (Betarbet et al. 2000). However, the results have been challenged based upon the following errors in experimental methodology: (1) that the continuous intravenous injection method used to treat the rats leads to "continuously high levels of the compound in the blood," and (2), that dimethyl sulfoxide (DMSO) was used to enhance tissue penetration (normal routes of exposure actually slow introduction of chemicals into the bloodstream). Finally, injecting rotenone into the body is not a normal way of assimilating the compound under field applications as proposed in this project. Similar studies (Marking 1988) have found no Parkinson-like results. Extensive research has demonstrated that rotenone does not cause birth defects (HRI 1982), gene mutations (Van Geothem et al. 1981; BRL 1982) or cancer (Marking 1988). Rotenone was found to have no direct role in fetal development of rats that were fed excruciatingly high concentrations of rotenone. Spencer and Sing (1982) reported that rats that were fed diets laced with 10-1,000 ppm rotenone over a 10 day period did not suffer any reproductive dysfunction. Typical concentrations of actual rotenone used in fishery management range from 0.025 to 0.50 ppm and are far below that administered during most toxicology studies.

Similar results determined that birds required levels of rotenone at least 1,000 to 10,000-times greater than is required for lethality in fish (Skaar 2001). Cutkomp (1943) reported that chickens, pheasants and members of lower orders of *Galliformes* were quite resistant to rotenone, and four day old chicks were more resistant than adults. Ware (2002) reports that swine are uniquely sensitive to rotenone and it is slightly toxic to wildfowl, but to kill Japanese quail required 4,500 to 7,000 times more than is used to kill fish.

The EPA (2007) made the following conclusion for birds;

Since rotenone is applied directly to water, there is little likelihood that terrestrial forage items for birds will contain rotenone residues from this use. While it is possible that some piscivorous birds may feed opportunistically on dead or dying fish located on the surface of treated waters, protocols for piscicidal use typically recommend that dead fish be collected and buried, rendering the fish less available for consumption (see Section IV). In addition, many of the dead fish will sink and not be available for consumption by birds. However, whole body residues in fish killed with rotenone ranged from 0.22 µg/g in yellow perch (Perca flavescens) to 1.08 µg/g in common carp (Cyprinus carpio; Jarvinen and Ankley 1998). For a 68 g yellow perch and an 88 g carp, this represents totals of 15 µg and 95 µg rotenone per fish, respectively. Based on the avian subacute dietary LC_{50} *of 4,110 mg/kg, a 1,000-g bird would have to consume 274,000 perch or 43,000 small carp. Thus, it is unlikely that piscivorous birds will consume enough fish to result in a lethal dose.*

<u>Amphibians and Reptiles</u>:

Potential amphibians and reptiles found within the Van Houten Lake treatment area include: long-toed salamanders (*Ambystoma macrodactylum*), spotted frogs (*Rana pretiosa*), western toads *(Bufo boreas)* (amphibians), and western terrestrial garter (*Thamnophis elegans*), common garter (*T. sirtalis*) and rubber boa (*Charina bottae*) snakes (reptiles). Rotenone can be toxic to gill-breathing larval amphibians, though air breathing adults are less sensitive. Chandler and Marking (1982) found that Southern Leopard frog tadpoles were between 3 and 10 times more tolerant than fish to Noxfish (5% rotenone formulation). Grisak et al. (2007) conducted laboratory studies on long-toed salamanders, Rocky Mountain tailed frogs (*Ascaphus truei*), and Columbia spotted frogs and concluded that the adults of these species would not suffer an acute response to Prenfish at trout killing concentrations (0.5-1 ppm) but the larvae would likely be affected. These authors recommended implementing rotenone treatments at times when the larvae are not present, such as the fall, to reduce the chance of exposure to rotenone treated water and potential impacts to larval amphibians. The Van Houten Lake treatment would be scheduled for late August or September (prior to brook trout spawning), which would reduce but not eliminate potential impacts to larval amphibians. Any reduction in amphibian abundance would be expected to be short term because of the low sensitivity of adults to rotenone, and because most larval amphibians would have metamorphosed by late August/early September, when the treatment is planned. A reduced abundance of aquatic invertebrates may temporally impact larval amphibians that prey on these species, though the aquatic invertebrate community would recover rapidly. Reptiles (air-breathing) would not be directly impacted by rotenone treatment, though snakes are known to consume trout which would be temporarily reduced by the proposed piscicide treatment.

It is important to note that many toxicity studies involve subjecting laboratory specimens to unusually high concentrations of rotenone, or conducting tests on animals that would not normally be exposed to rotenone during use in fisheries management.

Comment 5e. One of the proposed actions is to construct a fish migration barrier in the outlet of Van Houten Lake. This structure would preclude fish exiting Van Houten Lake from migrating from the unnamed tributary to the Big Hole River. This could impact populations of native fish including longnose sucker, white sucker, longnose dace, mottled sculpin or other native fish that may seasonally use the lake. However, this structure is necessary to ensure the long-term persistence of westslope cutthroat trout and the quality of the fishery in the lake. Further, these other species are widespread and Van Houten Lake is not critical habitat for the survival of these species. There is no current use of the lake or outlet stream by native salmonids such as Arctic grayling or westslope cutthroat trout.

Comment 5f: Dead fish would result from this project. It is possible that osprey or eagles would eat rotenone-killed fish. Bald eagles have been observed along the nearby Big Hole River. Conducting this project in the fall would not impact bald eagle nesting, and there would be no impacts to bald eagles that consume rotenone-killed fish. See comment 5c for impacts to birds.

The project area is within potential grizzly bear habitat, but there are no known grizzly bears currently inhabiting this area. This project should have little or no impact on grizzly bears because the bears are not dependent on fish for food. There would be no impact on grizzly bears that consume fish killed by rotenone or consume treated waters (See comment 5c for impacts to mammals).

The project site is within the range of lynx. Lynx are not known to be present near the project area but it is possible they could pass through the area. However, given the heavy human traffic in the area and development of the site for camping, the probability of lynx being present is very low. Lynx are not dependant on the stream or lake for fish. The impacts to this species may include temporary displacement during the construction of the fish barrier and treatment when personnel and equipment are present in the drainage. There should be no impacts from consuming treated waters or fish killed by rotenone for the same reasons as previously noted. Therefore, impacts to lynx and wolves should be minor and temporary. See comment 5c for impacts to mammals.

Westslope cutthroat trout, including some populations of slightly hybridized WCT, are considered a sensitive species. The intent of the proposed project is to restore WCT to Van Houten Lake by stocking fertile fish from sources around the Big Hole drainage. Arctic graying are also a sensitive species and until recently a candidate for listing under the Endangered Species Act. Establishing self sustaining populations of both species in Van Houten Lake is another step in ensuring the long term persistence of these two species within their native ranges.

Comment 5g. There is the potential for displacement of some animals during the implementation of this project (see Comment 5f). Mule deer, elk and other big game species may be temporarily displaced as crews are present in the drainage performing the proposed work. However, these impacts should only be minor and temporary. The total treatment should be completed within 2 weeks. Barrier construction should also be completed within a 1-2 week time window.

B. HUMAN ENVIRONMENT

6. NOISE/ELECTRICAL EFFECTS **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Increases in existing noise levels?			X		Yes	6a
b. Exposure of people to serve or nuisance noise levels?		X				
c. Creation of electrostatic or electromagnetic effects that could be detrimental to human health or property?		X				
d. Interference with radio or television reception and operation?		X				

Comment 6a: Noise levels will increase temporarily as heavy equipment is used to construct the fish barrier and perform the treatment. These impacts should be minor and temporary as the construction of the barrier and the treatment phase of the project is scheduled to last only a few days. There are no occupied structures within ½ mile of the fish barrier.

7. LAND USE **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Alteration of or interference with the productivity or profitability of the existing land use of an area?		X				
b. Conflicted with a designated natural area or area of unusual scientific or educational importance?		X				
c. Conflict with any existing land use whose presence would constrain or potentially prohibit the proposed action?		X				
d. Adverse effects on or relocation of residences?		X				

8. RISK/HEALTH HAZARDS **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Risk of an explosion or release of hazardous substances (including, but not limited to oil, pesticides, chemicals, or radiation) in the event of an accident or other forms of disruption?			X		Yes	8a

b. Affect an existing emergency response or emergency evacuation plan or create a need for a new plan?			X		Yes	8b
c. Creation of any human health hazard or potential hazard?			X		Yes	see 8a,c
d. Will any chemical toxicants be used?			X		Yes	see 8a

Comment 8a: The principal risk of human exposure to hazardous materials from this project would be limited to the applicators of the rotenone. All applicators would wear safety equipment required by the product label and MSDS (Material Safety Data Sheet) sheets. Such safety equipment may include respirator, goggles, rubber boots, Tyvek overalls, and Nitrile gloves. All applicators would be trained on the safe handling and application of the piscicide. At least one Montana Department of Agriculture certified pesticide applicator would supervise and administer the project. Materials would be transported, handled, applied and stored according to the label specifications to reduce the probability of human exposure or spill.

Comment 8b: FWP requires a treatment plan for rotenone projects. This plan addresses many aspects of safety for people who are on the implementation team such as establishing a clear chain of command, training, delegation and assignment of responsibility, clear lines of communication between members, a spill contingency plan, first aid, emergency responder information, personal protective equipment, monitoring and quality control, among others. Implementing this project should not have any impact on existing emergency plans. Because an implementation plan has been developed by FWP the risk of emergency response is minimal and any affects to existing emergency responders would be short term and minor.

Comment 8c: The EPA (2007) conducted an analysis of the human health risks for rotenone and concluded it has a high acute toxicity for both oral and inhalation routes, but has a low acute toxicity for dermal route of exposure. It is not an eye or skin irritant nor a skin sensitizer. The EPA could not provide a quantitative assessment of potentially critical effect on neurotoxicity risks to rotenone users, so a number of uncertainty factors were assigned to the rating values. An additional 10x database uncertainty factor, in addition to the inter-species (10x) uncertainty factor and intra-species (10x) uncertainty factor, has been applied to protect against potential human health effects and the target margin of exposure (MOE) is 1000. The following table summarizes the EPA toxicological endpoints of rotenone (from EPA 2007):

Exposure Scenario	**Dose Used in Risk Assessment, Uncertainty Factor (UF)**	**Level of Concern for Risk Assessment**	**Study and Toxicological Effects**
Acute Dietary (females 13-49)	NOAEL = 15 mg/kg/day UF = 1000 aRfD = $\frac{15\ mg/kg/day}{1000}$ = 0.015 mg/kg/day	Acute PAD = 0.015 mg/kg/day	Developmental toxicity study in mouse (MRID 00141707, 00145049) LOAEL = 24 mg/kg/day based on increased resorptions
Acute Dietary (all populations)	An appropriate endpoint attributable to a single dose was not identified in the available studies, including the developmental toxicity studies.		

Chronic Dietary (all populations)	NOAEL = 0.375 mg/kg/day UF = 1000 cRfD = 0.375 mg/kg/day = 0.0004 mg/kg/day 1000	Chronic PAD = 0.0004 mg/kg/day	Chronic/oncogenicity study in rat (MRID 00156739, 41657101) LOAEL = 1.9 mg/kg/day based on decreased body weight and food consumption in both males and females
Incidental Oral Short-term (1-30 days) Intermediate-term (1-6 months)	NOAEL = 0.5 mg/kg/day	Residential MOE = 1000	Reproductive toxicity study in rat (MRID 00141408) LOAEL = 2.4/3.0 mg/kg/day [M/F] based on decreased parental (male and female) body weight and body weight gain
Dermal Short-, Intermediate-, and Long-Term	NOAEL = 0.5 mg/kg/day 10% dermal absorption factor	Residential MOE = 1000 Worker MOE = 1000	Reproductive toxicity study in rat (MRID 00141408) LOAEL = 2.4/3.0 mg/kg/day
Inhalation Short-term (1-30 days) Intermediate-term (1-6 months)	NOAEL = 0.5 mg/kg/day 100% inhalation absorption factor	Residential MOE = 1000 Worker MOE = 1000	[M/F] based on decreased parental (male and female) body weight and body weight gain
Cancer (oral, dermal, inhalation)	Classification; No evidence of carcinogenicity		

UF = uncertainty factor, NOAEL = no observed adverse effect level, LOAEL = lowest observed adverse effect level, aPAD = acute population adjusted dose, cPAD = chronic population adjusted does, RfD = reference dose, MOE = margin of exposure, NA = Not Applicable

Rotenolenoids are common degradation products found in the parent plant material used to make piscicidal forms of rotenone. The EPA (2007) concluded these degradation products are no more toxic than the active ingredient.

The EPA analysis of acute dietary risk for both food and drinking water concluded;

> *"…When rotenone is used in fish management applications, food exposure may occur when individuals catch and eat fish that either survived the treatment or were added to the water body (restocked) prior to complete degradation. Although exposure from this route is unlikely for the general U.S. population, some people might consume fish following a rotenone application. EPA used maximum residue values from a bioaccumulation study to estimate acute risk from consuming fish from treated water bodies. This estimate is considered conservative because the bioaccumulation study measured total residues in edible portions of fish including certain non-edible portions (skin, scales, and fins) where concentrations may be higher than edible portions (tissue) and the Agency assumed that 100% of fish consumption could come from rotenone*

exposed fish. In addition, fish are able to detect rotenone's presence in water and, when possible, attempt to avoid the chemical by moving from the treatment area. Thus, for partial kill uses, surviving fish are likely those that have intentionally minimized exposure.
Acute exposure estimates for drinking water considered surface water only because rotenone is only applied directly to surface water and is not expected to reach groundwater. The estimated drinking water concentration (EDWC) used in dietary exposure estimates was 200 ppb, the solubility limit of rotenone. The drinking water risk assessment is conservative because it assumes water is consumed immediately after treatment with no degradation and no water treatment prior to consumption.
Acute dietary exposure estimates result in dietary risk below the Agency's level of concern. Generally, EPA is concerned when risk estimates exceed 100% of the acute population adjusted dose (aPAD). The exposure for the "females 13-49 years old" subgroup (0.1117 mg/kg/day) utilized 74% of the aPAD (0.015 mg/kg/day) at the 95^{th} percentile (see Table 5). It is appropriate to consider the 95^{th} percentile because the analysis is deterministic and unrefined. Measures implemented as a result of this RED will further minimize potential dietary exposure (see Section IV)..."

As for evaluating the human chronic risk from exposure to rotenone treated water, the EPA acknowledges the following four principle reasons for concluding there is a low risk:

- the rapid natural degradation of rotenone
- using active detoxification measures by applicators such as potassium permanganate dilutes the rotenone
- properly following piscicide labels prohibit the use near water intakes
- proper signing, public notification or area closures limit public exposure to rotenone treated water.

As for recreational exposure, the EPA concludes no risk to adults who enter treated water following the application by dermal and incidental ingestion, but requires a waiting period of 3 days after a treatment before toddlers swim in treated water. The aggregate risk to human health from food, water and swimming does not exceed the EPA level of concern (EPA 2007). Recreationists in the area would likely not be exposed to the treatments because signs would be in place to warn recreationists that the stream and lakes are being treated with rotenone and closed to entry. Proper warning through news releases, signing the project area, temporary road closure and administrative personnel in the project area should be adequate to keep unintended recreationists from being exposed to any treated waters.

Fisher (2007) conducted an analysis of the inert constituent ingredients found in the rotenone formulation of CFT Legumine for the California Department of Fish and Game. These inert ingredients are principally found in the emulsifying agent Fennodefo[99] which helps make the generally insoluble rotenone more soluble in water. The constituents were considered because of their known hazard status and not because of their concentrations in the Legumine formulation. Solvents such as xylene, trichloroethylene (TCE) and tetrachloroethylene are residue left over from the process of extracting rotenone from the root and can be found in some lots of Legumine. However, inconsistent detectability and low occurrence in other formulations that used the same extraction process were below the levels for human health and ecological risk. Solvents such as toluene, n-butylbenzene, 1,2,4 trimethylbenzene and naphthalene are present in Legumine, and when used in other applications can be an inhalation risk. However, because of their low concentrations in this formulation, the human health risk is low. The remaining constituents, the fatty acid esters, resin acids, glycols, substituted benzenes, and 1-hexanol were likewise present but either analyzed, calculated or estimated to be below the human health risk levels when used in a typical fish eradication project.

Methyl pyrrolidone is also found in Legumine. It is known to have good solvency properties and is used to dissolve a wide range of compounds including resins (rotenone). Analysis of Methyl pyrrolidone in Legumine showed it represents about 9% of the formulation (Fisher 2007). The analysis concluded regarding the constituent ingredients in Legumine;

> "…None of the constituents identified are considered persistent in the environment nor will they bioaccumulate. The trace benzenes identified in the solvent mixture of CFT Legumine™ will exhibit limited volatility and will rapidly degrade through photolytic and biological degradation mechanisms. The PEGs are highly soluble, have very low volatility, and are rapidly biodegraded within a matter of days. The fatty acids in the fatty acid ester mixture (Fennodefo99™) do not exhibit significant volatility, are virtually insoluble, and are readily biodegraded, although likely over a slightly longer period of time than the PEGs in the mixture. None of the new compounds identified exhibit persistence or are known to bioaccumulate. Under conditions that would favor groundwater exchange the highly soluble PEGs could feasibly transmit to groundwater, but the concentrations in the reservoir, and the rapid biodegradation of these constituents makes this scenario extremely unlikely. Based upon a review of the physicalchemistry of the chemicals identified, we conclude that they are rapidly biodegraded, hydrolyzed and/or otherwise photolytically oxidized and that the chemicals pose no additional risk to human health or ecological receptors from those identified in the earlier analysis. None of the constituents identified appear to be at concentrations that suggest human health risks through water, or ingestion exposure scenarios and no relevant regulatory criteria are exceeded in estimated exposure concentrations…"

The Legumine MSDS states "…when working with an undiluted product in a confined space, use a non-powered air purifying respirator…and… air-purifying respirators do not protect workers in oxygen-deficient atmospheres…" It is not likely that workers would be handling Legumine in an oxygen deficient space during normal use. However, to guard against this, proper ventilation and safety equipment would be used according to the label requirements.

The advantage of CFT Legumine over Prenfish is that it has less petroleum hydrocarbon solvents such as toluene, xylene, benzene and naphthalene. By comparison, Prenfish has a strong chemical odor. CFT Legumine is virtually odor-free and performs almost identically to Prenfish.

In their description of how South American Indians prepare and apply *Timbó*, a rotenone parent plant, Teixeira, et al. (1984) reported that the Indians extensively handled the plants during a mastication process, and then swam in lagoons to distribute the plant pulp. No harmful effects were reported. It is important to note that the primitive method of applying rotenone from root does not involve a calculated target concentration, metering devices or involve human health risk precautions as those involved with fisheries management programs.

During the piscicide treatment, the lake will be temporarily closed to public access and signs will be posted to notify the public to the project and closure.

9. COMMUNITY IMPACT **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Alteration of the location, distribution, density, or growth rate of the human population of an area?		X				
b. Alteration of the social structure of a community?		X				
c. Alteration of the level or distribution of employment or community or personal income?		X				
d. Changes in industrial or commercial activity?		X				
e. Increased traffic hazards or effects on existing transportation facilities or patterns of movement of people and goods?		X				

10. PUBLIC SERVICES/TAXES/UTILITIES **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Will the proposed action have an effect upon or result in a need for new or altered governmental services in any of the following areas: fire or police protection, schools, parks/recreational facilities, roads or other public maintenance, water supply, sewer or septic systems, solid waste disposal, health, or other governmental services? If any, specify: ________________		X				
b. Will the proposed action have an effect upon the local or state tax base and revenues?		X				

c. Will the proposed action result in a need for new facilities or substantial alterations of any of the following utilities: electric power, natural gas, other fuel supply or distribution systems, or communications?		X				
d. Will the proposed action result in increased used of any energy source?		X				
e. Define projected revenue sources		X				
f. Define projected maintenance costs		X				

11. AESTHETICS/RECREATION **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Alteration of any scenic vista or creation of an aesthetically offensive site or effect that is open to public view?		X				
b. Alteration of the aesthetic character of a community or neighborhood?		X				
c. Alteration of the quality or quantity of recreational/tourism opportunities and settings? (Attach Tourism Report)			X			11 c.
d. Will any designated or proposed wild or scenic rivers, trails or wilderness areas be impacted? (Also see 11a, 11c)		X				

Comment 11c. The project will temporally close the lake to public access while the rotenone is being applied. Also, catchable-sized sterile hatchery westslope cutthroat trout will be stocked the following spring to allow for fishing opportunity as the wild westslope cutthroat trout and Arctic grayling become established.

12. CULTURAL/HISTORICAL RESOURCES **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Destruction or alteration of any site, structure or object of prehistoric historic, or paleontological importance?		X				12a
b. Physical change that would affect unique cultural values?		X				
c. Effects on existing religious or sacred uses of a site or area?		X				

d. Will the project affect historic or cultural resources?		X				

Comment 12a. The Forest Service has conducted a separate NEPA analysis of the site that included a cultural inventory and no cultural resources were identified that would be impacted by this project. If cultural resources are encountered during construction, activities will be halted and a cultural resource specialist will be consulted.

13. SUMMARY EVALUATION OF SIGNIFICANCE **Will the proposed action, considered as a whole:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Have impacts that are individually limited, but cumulatively considerable? (A project or program may result in impacts on two or more separate resources which create a significant effect when considered together or in total.)		X				
b. Involve potential risks or adverse effects which are uncertain but extremely hazardous if they were to occur?		X				
c. Potentially conflict with the substantive requirements of any local, state, or federal law, regulation, standard or formal plan?		X				
d. Establish a precedent or likelihood that future actions with significant environmental impacts will be proposed?		X				
e. Generate substantial debate or controversy about the nature of the impacts that would be created?			X		Yes	13e
f. Is the project expected to have organized opposition or generate substantial public controversy? (Also see 13e)			X		Yes	13f
g. List any federal or state permits required.						13g

Comments 13e and f: The use of piscicide can generate controversy from some people. Public outreach and information programs can educate the public on the use of pesticides. It is not known if this project would have organized opposition but similar projects completed over the past 4 years have had little opposition. The public will have the opportunity to comment on the proposal, and public input will be considered as part of the final decision.

Comment 13g: The following permit would be required:

MDEQ 308 - Department of Environmental Quality (authorization for short term exemption of surface water quality standards for the purpose of applying a fish toxicant)
Section 404 Permit from the Army Corps of Engineers,
MDEQ 318 Permit from Montana DEQ for temporary exemption of water quality standards for the purpose of constructing the fish barrier
Floodplain Permit from Beaverhead County for construction of the barrier
124 Permit from Montana Fish, Wildlife and Parks will be required for the construction of the fish barrier.

PART IV. ENVIRONMENTAL IMPACT STATEMENT REQUIRED?

After considering the potential impacts of the proposed action and possible mitigation measures, FWP has determined that an Environmental Impact Statement is not warranted. The impacts of restoring native fish to Van Houten Lake and removing native suckers should be minimal and are expected to improve the quality of the trout fishery. Given the low risk of negative environmental impacts of the proposed action, it has been determined that no further analysis is necessary.

PART V. PUBLIC INVOLVEMENT AND PREPARATION

Submit written comments to: Jim Olsen
Montana Fish Wildlife and Parks
c/o Van Houten Lake EA
1820 Meadowlark Lane
Butte, MT 59701

Comment period is 30 days. Comments must be received by August 20, 2015.

Prepared by : Jim Olsen Date: July 21, 2015

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